

Profiling machine with a plurality of in-line arranged forming stations

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Abstract of EP1245302

The profiling machine has a number of shaping stations (1) arranged in line for multi-stage forming of a workpiece (2). Each station has a tool (8), comprising a pair of rollers, for shaping the workpiece. Position sensors (18) are used to determine position data for all the roller tools, while a central data processing unit (3) collects and processes the position data and if necessary positions the rollers using actuators.

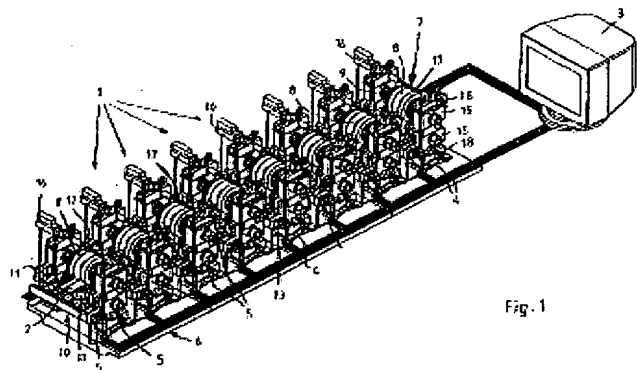


Fig. 1

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Description

[0001] The invention relates to a profiling machine with several forming stations arranged in series for multi-stage forming of a work piece to be profiled, whereby the forming stations are provided with roll form tools supported in tool holding fixtures which are adjustable in their position and which act together in pairs, between which the work piece is passed through and in the process is formed. A typical example of such a profiling machine is disclosed in DE 27 32 233 B1.

[0002] Profiling machines of the initially named type are usually set up together with a run-in table preceding the forming stations, one or more straightening devices and if necessary a cross-cut machine in order to form a production line for the production of finished profiles made of sheet material. Tool holding fixtures within the meaning of this application are in particular stands which exhibit at least two horizontal running axes for the conduction of roll form tools, or lateral roller tables upon which at least two running rolls are supported on parallel vertical running axes.

[0003] Conceptually, a profiling machine is a mass production machine. It can produce a very large quantity of identically formed profiles in a very short time. Because of its design, flexibility is a foreign concept to a profiling machine; a retooling of the profiling machine to a different profile or a different material of the work piece to be profiled requires in any case a longer trial stage or break-in phase with corresponding scrapping of material until the produced profile meets the standards. This also holds true when a profile has already been produced once and is to be produced again at a later date.

[0004] In order to reduce this disadvantage, in the past quick change systems were proposed, for example as described in DE 1 527 981. The tool holding fixtures there are stands with fixed roll form tools, whereby the stands are designed to be interchangeable. It is obvious that such a quick change system for profiling machines with a greater number of forming stations will be very expensive.

[0005] In addition there are, particularly in the case of complicated profiles, which require a multiplicity of forming steps, a multitude of setting parameters which influence the achieved result, so that for the testing of a newly developed tool, however also for the breaking in of a newly set up profiling machine and the readjustment for example in the case of a material change or in the case of a worsening result, only experienced specialized forces for readjusting the adjustable roll form tools come into question.

[0006] The invention is therefore based on the object of making a profiling machine of the initially named type more production-safe even for a less practiced operator and to simplify a retooling of the profiling machine.

[0007] This problem is solved by means of a profiling machine with the features of the attached Patent Claim 1.

[0008] Advantageous improvements and embodiments of the invention are set down in writing in Claims 2 through 15.

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[0009] A profiling machine of the initially named type is in accordance with the invention provided with data entry media which record the positional data of all adjustable roll form tools, as well as being provided with a central data processing equipment which records the positional data reported by the data entry media and further processes the data.

[0010] The subsequent processing can in the simplest case consist in storing all positional data of the set roll form tools optimized for production as a special data record for later use. In this way advantageously at any time an optimal setting of the roll form tools can be retrieved anytime after a change, when, for example after a tool change, but also after a production batch with material of a different nature, you go back to the marginal conditions from that time. It immediately becomes clear that such a detailed positional data record considerably simplifies the breaking in of the machine to once discovered optimal values and that the production scrapping connected with this is minimized.

[0011] The subsequent processing of the positional data can, however, also alternatively or additionally go in an entirely different direction and, as described further below, for example with software that operates in accordance with the principle of neural networks and/or with fuzzy-logic tools, result in a kind of self-learning system and hence become a virtual assistant in the trial stage of the profiling machine.

[0012] The output of the stored and retrieved data records or of the recorded and subsequently processed positional data can take place on an information carrier, for example a screen, through which the operator of the profiling machine gets instructions and suggestions about how to set the various roll form tools; however it is particularly advantageous when all adjustable roll form tools or their tool holding fixtures are provided with motorized adjustment elements controlled by the data processing equipment. The retooling of the entire profiling machine to for example an earlier profile that had been produced can then take place "at the press of a button". In addition intermediate values for setting up and making adjustments to the profiling machine can be stored as a data record and, if a change in the positions of various roll form tools performed beginning at this time proves to be less than ideal, these changes can be comfortably returned to the intermediate value. Of course this considerably accelerates the purely empirical process of adjustment.

[0013] The data entry media for the recording of the positional data of all the adjustable roll form tools can for example be carried out with laser technology, whereby the exact position of the roll form tools is optically detected; however the recording of the positional data becomes quite easy when the tool holding fixtures are provided with adjustment elements for the adjustment of the positions of the roll form tools whose setting values serve as positional data of the respective roll form tools. It is particularly advantageous in the process when these adjustment elements are constructed as servomotors which relay their respective position electronically to the central data processing equipment and can be activated from there.

[0014] The central data processing of the inventive profiling machine can be programmed in various ways. For the purpose of making it possible for even unpracticed operators to

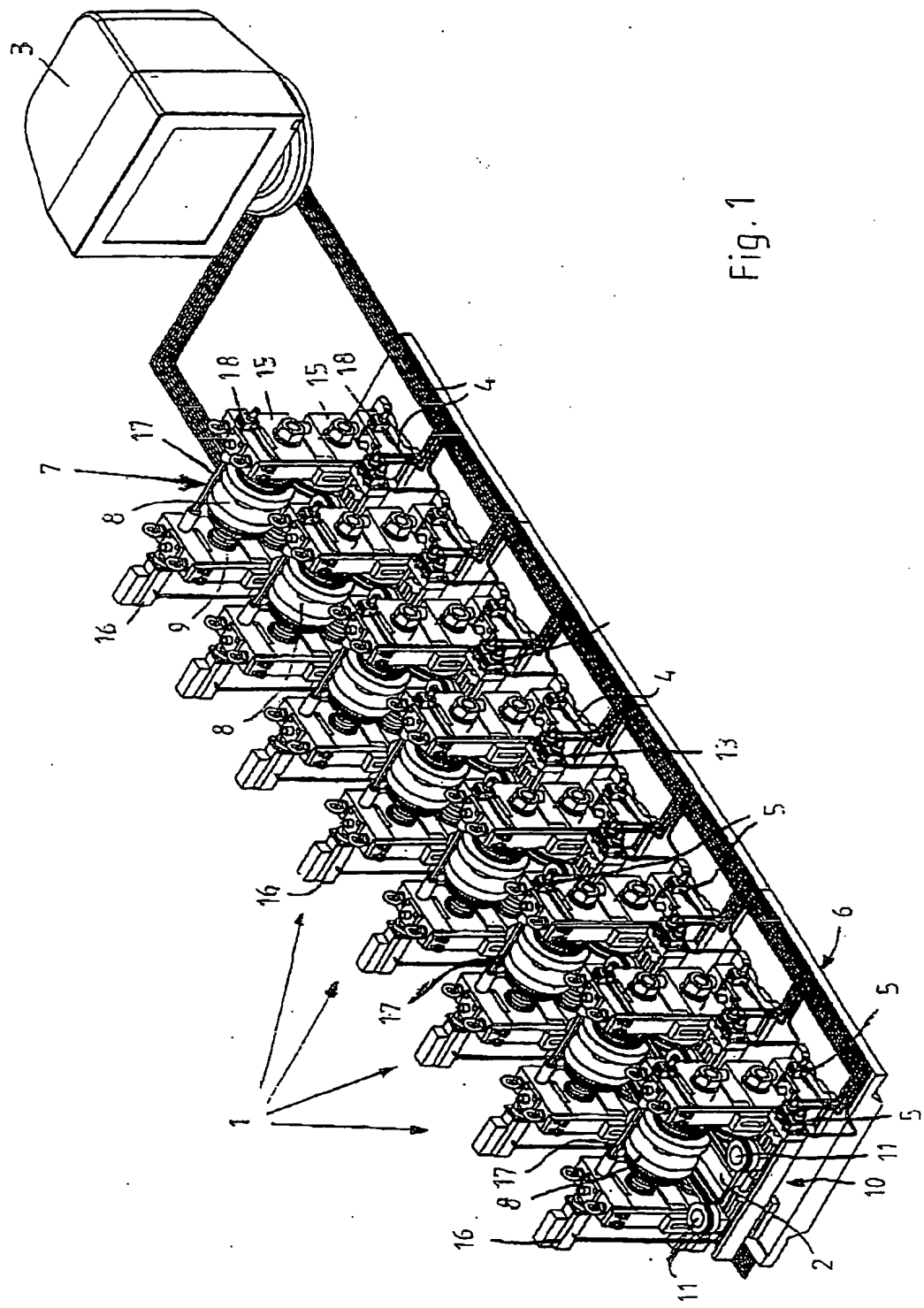


Fig. 1

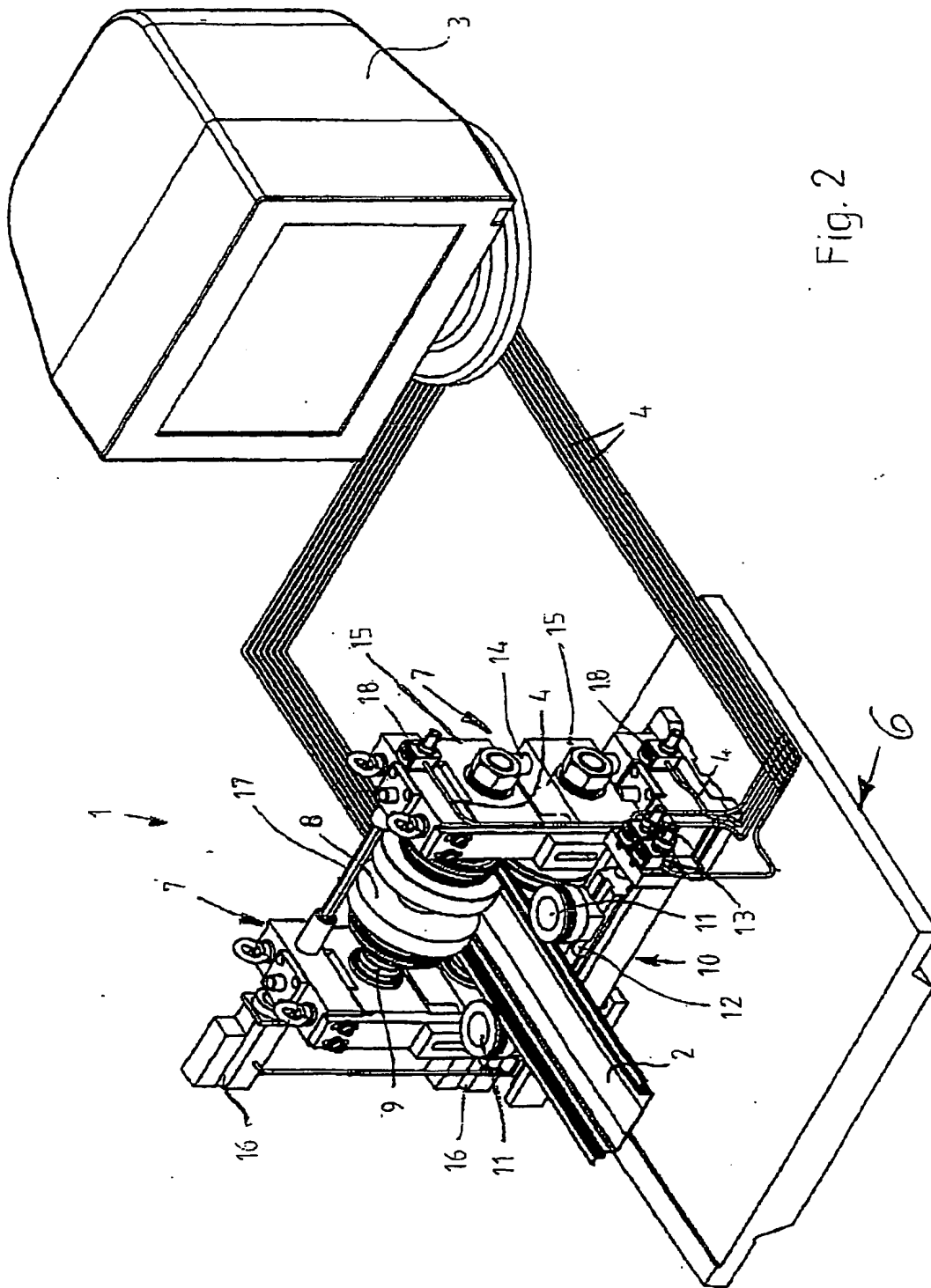


Fig. 2

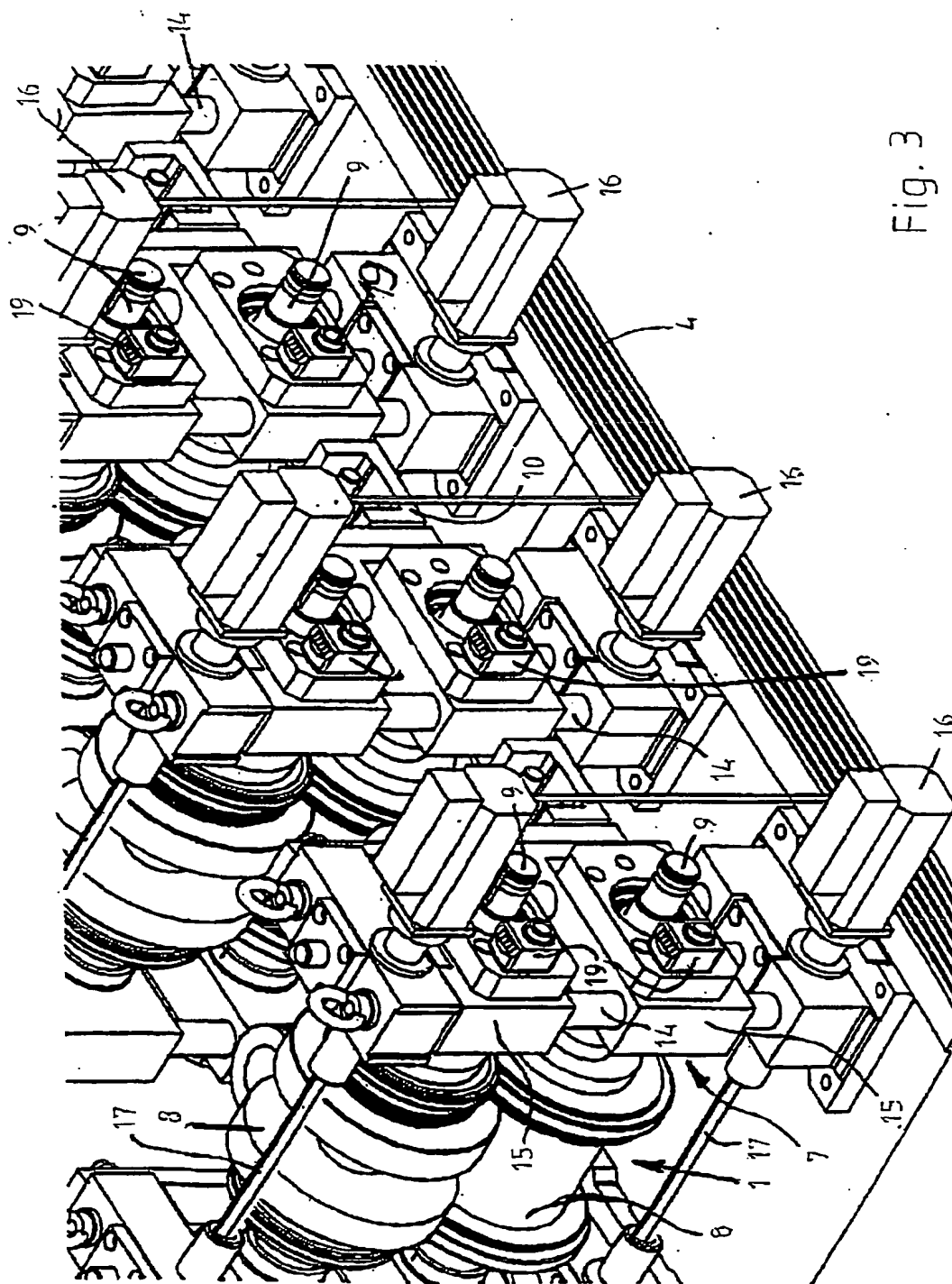


Fig. 3